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Gastrointestinal Smooth Muscle Tumors and Iron Deficiency Anemia in Children

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Smooth muscle tumors are rarely seen in the pediatric population. We present a child with smooth muscle tumor of low malignant potential in the ileocecal valve region in whom iron deficiency anemia was the only presenting sign. Abdominal computed tomographic (CT) scan, barium enema, and colonoscopy revealed the mass. Following resection of the tumor the anemia was corrected and the child feels well. Med. Pediatr. Oncol. 28:441–443, 1997. © 1997 Wiley-Liss, Inc.

Key words: iron deficiency anemia; smooth muscle tumor; gastrointestinal bleeding

INTRODUCTION

Benign tumors of the intestine (such as polyps, including juvenile colonic polyps, familial polyposis coli, hemangiomas, and leiomyomas) are rarely found in the pediatric population [1,2]. The clinical presentation of intestinal smooth muscle tumors (SMT) is variable, and they are very seldom considered in the differential diagnosis of iron deficiency anemia (IDA) in childhood.

We describe a patient with SMT of the ileocecal valve (ICV) in whom IDA was the only presenting sign. SMT of the ICV to the best of our knowledge has not been described previously in children.

CASE REPORT

A 5-year-old boy presented with fatigue and anorexia. His medical history was unremarkable. Physical examination revealed a pale, but otherwise healthy appearing young male.

Laboratory studies revealed the following: hemoglobin 76 g/l; hematocrit: 26%; mean corpuscular volume (MCV): 52.7 dl; mean corpuscular hemoglobin (MCH): 15.4 pg; red cell distribution width (RDW): 36.1%; ferrum: 47 μg/dl; iron binding capacity (IBC): 283 μg/dl; reticulocytes: 2.1%; leukocytes: 11.7×10^6/l; platelets: 778×10^6/l.

A tentative diagnosis of IDA was made and treatment with iron (6 mg/kg) was started, resulting in partial improvement. Further investigation on repeated stool examination showed two positive results for occult blood.

An ultrasound of the abdomen revealed several solid masses in the right lower abdomen. The diameter of the largest mass was 4 cm.

Computed tomography showed thickening of the wall of the small intestine, enlargement of mesenteric lymph nodes, a filling defect in the cecum, and solid intraperitoneal masses, adjacent the cecum and ascending colon (Fig. 1).

Barium enema revealed a lobular filling defect of the cecum; there was no filling of the small intestine or appendix (Fig. 2). X-rays and computed tomography of the chest were normal.

Further investigation included blood tests for biochemistry, β-human chorionic gonadotrophin (βHCG), prothrombin (PT), and partial thromboplastin time (PTT), and all were normal; urine vanillyl mandelic acid (VMA) was also within normal limits. A Mantoux test was negative, and erythrocyte sedimentation rate (ESR) equaled 100/1 hr.

Transmural biopsy of the mass was performed through colonoscopy. Pathologic evaluation revealed granulation tissue and ulceration of the intestinal mucosa.

Explorative laparotomy revealed a large mass (6 × 8 cm) which occupied the ICV and the cecum and a large number of firm mesenteric lymph nodes. Resection of the cecum, terminal ileum, and a part of the ascending colon with end to end anastomosis was performed. A surgical specimen from the right hemicolectomy was sent for histopathological evaluation. The postoperative course was unremarkable. Six months after the operation the child is in good health; his hemoglobin level is 120 g/l.

Macroscopic Examination

The specimen included a 12 cm long terminal ileum, cecum with a 10 cm long ascending colon, and a 6 cm long appendix. The terminal ileum was 2.5 cm in diameter and appeared unremarkable. The ICV was severely narrowed by a polypoid bulge of the intestinal wall and

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Fig. 1. Contrast enhanced computed tomography demonstrates tumor filling defect in the cecum (arrow) and solid intraperitoneal masses adjacent the ascending colon.

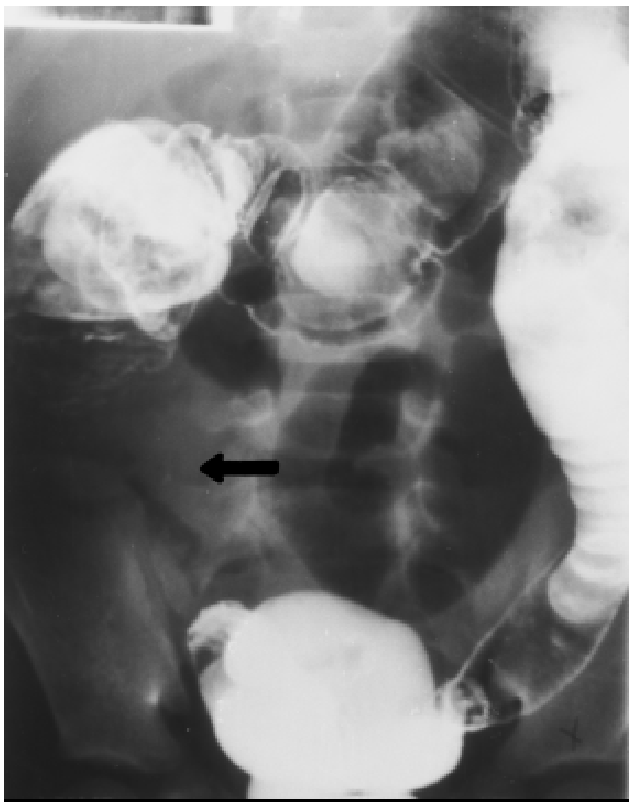

Fig. 2. Barium enema demonstrating filling defect of the cecum (arrow).

by a 5 cm diameter intraluminal ulcerated mass. On a cross-sectional slice specimen, both the polypoid and intramural tumoral components were continuous, firm, and appeared white-gray in color (Fig. 3).

Microscopic Examination

Formalin and B5 fixed paraffin embedded sections were stained in the routine way with hematoxylin-eosin

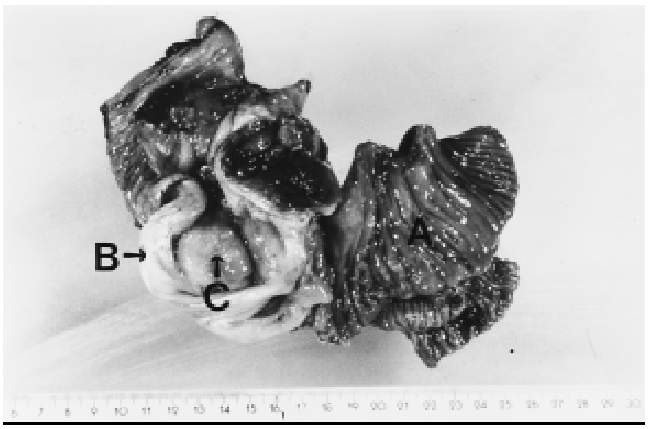

Fig. 3. Macroscopic view of the right hemicolectomy specimen showing intact terminal ileum (A) and both cecal wall thickening (B) and intraluminal components of the tumor (C).

and then with periodic acid-Schiff solution (PAS). The tumor was composed of smooth muscle cells arranged in intersecting fascicles arising from the intestinal wall including intraluminal and intramural components. The tumor involved both muscularis mucosa and muscularis propria layers and invasion of mucosal layer was noticed with focal ulceration. Two to four mitotic figures per 10 high power fields were present. Cellularity was intermediate, and no nuclear pleomorphism was noted (Fig. 4). Thirteen regional lymph nodes examined showed reactive hyperplasia. Immunohistochemical staining with primary monoclonal antibody for α smooth muscle actin (BioMaker clon 14A) demonstrated positive staining in the tumor cells (Fig. 2) which also contained PAS positive cytoplasm. We diagnosed the lesion as a SMT of low malignant potential.

DISCUSSION

SMTs occur rarely in childhood. They may arise in any part of the body where smooth muscles are present, including the intestine. Of the 76 SMTs reported in children by Yannopoulos and Stout [2], only 19 were located in the gastrointestinal (GI) tract and most were leiomyomas and leiomyosarcomas. Histologically leiomyomas are composed of bundles of smooth muscle cells in a framework of connective tissue. There are difficulties in differentiating leiomyomas from leiomyosarcomas. According to Cummings et al. [3], the most useful criteria for malignancy are the presence of five or more mitoses per 10 high power fields. Akwari et al. [4] and Evans [5] concluded, also, that the degree of mitotic activity is the most important single factor in determining biologic aggressiveness of SMTs. Moyana et al. [6] summarized their experience with colorectal SMT in adults. Tumor size appeared in their study to be the best predictor for biologic aggressiveness. Correlative clinicopathologic studies showed that histopathologic parameters such as

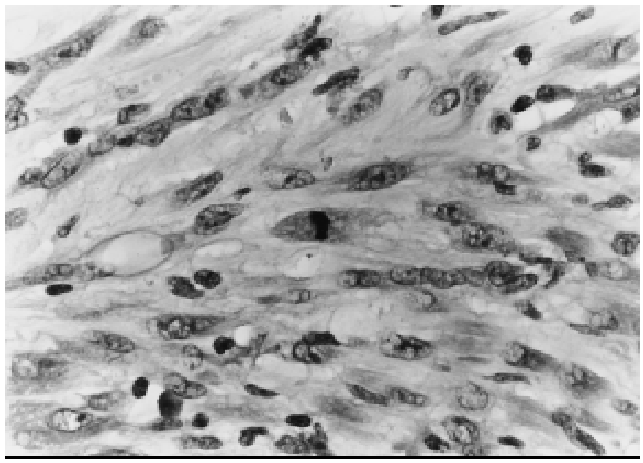

Fig. 4. Hematoxylin-eosin staining of neoplastic cells and mitotic figure. ×320.

the degree of mitotic activity could not be applied equitably to SMTs in every location [7–9]. Hence arose the concept of site specificity, as the criteria for malignancy in SMTs vary considerably from site to site, even within the bowel itself. Other indicators of malignancy include anaplasia, and an area of necrosis. Our patient, therefore, had a low grade malignant SMT.

SMTs have been described more recently in immunocompromised children: human immunodeficiency virus (HIV) infected patients and patients with liver and renal transplantations [10, 11].

Reviewing the literature on childhood GI SMT, only a small number of colonic leiomyomas are found [12–14]. Only one 10-year-old male with a cecal leiomyoma presenting with obstructive symptoms was reported [12].

IDA was determined in our patient based on low levels of hemoglobin, hematocrit, MCV, MCH, and transferrin saturation as well as a very high level of RDW. Serum iron concentration of 47 μg/dl was relatively higher than expected, but this can be explained by diurnal variation of iron levels, being usually high in the mornings (the time of blood sampling in this case).

IDA due to inadequate dietary iron is a common finding in infancy, but after the age of 3 years it is relatively infrequent. Blood loss must be considered a possible cause in an older child with IDA [1]. Lower intestinal bleeding in children has most frequently been described with GI polyps, ulcerative colitis, Meckel's diverticulum, and Henoch-Schonlein purpura [15, 16]. In our patient, evidence of GI bleeding was noted in the form of two positive tests for occult blood in stools. Since dietary iron is absorbed mainly in the duodenum and proximal ileum, it is unlikely that malabsorption of iron was the mechanism of IDA in our patient.

Other optional mechanisms to explain the anemia in this case are iron consumption by the tumor and inadequate intake of iron by the patient. We have no data to support either of these assumptions. The pathological examination of the tumor confirms that bleeding from ulcerations of the tumor was responsible for the anemia in this patient. Following removal of the tumor the iron status of the child has ameliorated significantly.

SMT of low grade malignancy, once removed completely, should not be treated by any other modality. Pediatric patients with SMT deserve careful follow-up for recurrence.

Although tumors are a very rare cause of GI tract bleeding in children, they must be considered in the differential diagnosis of IDA.

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